

Stationary model in rotation schemes

Jan Kowalski

Warsaw University of Technology, Poland

Abstract

We consider a sequence of surveys involving rotation of elements in the sample. For each occasion an optimal linear unbiased estimator (BLUE) of the current population mean, based on all available previous knowledge, may be found. Our object of interest are linear recurrence relations between the BLUE estimators obtained on successive occasions. Then each estimator may be computed recursively and at a reduced cost. We aim at finding explicit formulas for the solution.

In its original version (Binder and Hidirolou, 1988) the problem is formulated in a fairly general manner. However, an efficient method to obtain the solution is hard to find. We introduce a class of 'cascade' patterns, meaning that the rotation scheme should have a sufficiently regular structure. Such a class contains in particular the Current Population Survey (CPS) and the Polish Economical Activity Survey (BAEL). Moreover, we consider the stationary form of the recurrence. This in turn may be identified with passing to the limit with occasion number in the solution to the classical version.

Our gain is the ability to apply a more convenient, operator-based approach to the optimization problem. The problem itself may then be reduced to selecting a certain subset of the set of all the roots of a polynomial with real coefficients. The results were obtained together with Jacek Wesolowski from the Central Statistical Office of Poland.

Keywords

BLUE, Rotation scheme, Rotated panel, Regression, Linear equations.

References

- Binder, D.A. and M.A. Hidirolou (1988). Sampling in Time. *Handbook of Statistics 6*, 187–211.
- Kowalski, J. (2006). Rotation in sampling patterns. Submitted.
- Patterson, H. (1950). Sampling on successive occasions. *J. R. Stat. Soc. Ser. B Stat. Methodol.* 12, 241–255.
- Rao, J. and J. Graham (1964). Rotation Designs for Sampling on Repeated Occasions. *J. Amer. Statist. Assoc.* 50, 492–509.